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pure equity or of economic expediency. They are rather to be directed, if at all, by seeking what produces an impression on them and what seduces them. The danger to civilization in this psychology of crowds lies in the fact that the dogmas whose birth we are now witnessing will soon have the force of old dogmas, that is to say, the tyrannical and sovereign force of being above discussion. The divine right of the masses is about to replace the divine right of kings. Nevertheless, M. Le Bon affirms that it would be dangerous to meddle with the organization of crowds, notwithstanding their psychological inferiority. The facts of history have demonstrated that social organisms are every whit as complicated as those of all beings, and it is not in our power to force them to undergo any sudden or far-reaching transformation.

M. Le Bon's account of the general psychology of crowds is supplemented by a detailed analysis of more special characteristics, in separate chapters on the sentiments and morality of crowds, the ideas, reasoning power and imagination of crowds, the religious shape assumed by the convictions of crowds, and the immediate factors of the opinions of crowds. In the latter part of his volume he describes different kinds of crowds, including criminal crowds, electoral crowds and parliamentary assemblies.

The chief criticisms to be passed upon this volume are: First, that the author has not acknowledged, as he should have done, his very obvious indebtedness to the greatest living social psychologist, M. Tarde, whose 'Les Lois de l'imitation' and 'La logique sociale' contain in their original form many of the suggestions which have governed M. Le Bon's thoughts. Second, that he makes rather too much, probably, of what he would call the hypnotic phenomena of crowds, and too little of the absence of personal responsibility which the individual feels when he unites with his fellowmen in collective action.

FRANKLIN H. GIDDINGS.

Laboratory Practice for Beginners in Botany. By

WILLIAM A. SETCHELL, PH. D., Professor of Botany in the University of California.

New York, The Macmillan Company. 1897.
Pp. xiv+199. Price, 90 cents.

There are already a number of laboratory guides in elementary botany and, judging from the announcements of book publishers and their statements in conversation, there are soon to be several others. Their multiplication only argues that no single outline will satisfy other teachers. No good teacher can follow closely the outlines of instruction laid down by another; each must throw his own personality into the work and the method, and the conditions of time, place and facilities for work will all enter into the problem of how to teach an introductory class in botany. The author of the work in hand recognizes this condition when he says (p. 137): "The ideal way is to teach the student without any book."

The book illustrates what we regard as a false principle of instruction, though one much in vogue, namely, the telling a pupil in advance to see certain things before he has had a chance to look for something himself; this, followed too closely, can only result in preventing the development of any originality in the pupil and tends to reduce him to a mere machine. To illustrate the method followed, we quote from one of the chapters:

"I. Take a piece of stem of the Japanese Quince, which has several leaves attached to it. Examine the leaves and notice that:

"1. They are all borne on the sides of the stem (*i. e.*, that they are *lateral structures*).

"2. They are broad and thin (*i. e.*, they are also *expanded structures*).

"3. Their color is green. (This is not true for all leaves, *e. g.*, examine the leaves of some common red Colias [*sic*] of the garden or greenhouse, in which another coloring-matter is present and hides the green.)

"4. They are all borne at the *nodes* of the stem. (We may consequently separate that portion of the plant above the root into a number of similar parts, each of which may be called a *phytomer* or plant part. Each phytomer will consist of an *internode*, and a *node* with its *leaf* or *leaves*. Sketch a phytomer of the Japanese Quince and label it.")

This criticism is, of course, general, applying to many books of its class that have been

adapted to students of various grades in various subjects. They may be useful for giving suggestions to teachers who are themselves poorly prepared, but are not of the character to be placed in the hands of the beginning pupil. The pupil, to again quote the sentiment of the author, should be taught without books.

Treated, however, as a book for the instruction of teachers, this work possesses many meritorious features, among which we may mention :

1. It outlines work that can be accomplished without the aid of a compound microscope. This is highly important, because many schools cannot be equipped with compound microscopes, and what is a better reason, because a pedagogical one, it will prevent pupils becoming familiar with the compound microscope before they have exhausted the possibilities of the simple one. Botanical perspective cannot be attained by looking down the tube of a compound microscope alone, and the failure to learn how to use the unaided eye or a simple lens has been responsible for some of the lack of perspective in the rising generation of botanists.

2. It emphasizes the ecological side of botany, which is destined to be the next ruling feature of elementary botanical instruction.

3. Its list of required laboratory books for the teacher is short but excellent, and emphasizes the feature last named in such books as those of Kerner and Selina Gaye, and rigidly excludes manuals and other works on systematic botany which belong to a later stage in the evolution of botanical students.

Besides the general criticism given above, which falls on this book only as one of a special class, there are features peculiar to itself that could be improved. For example, it combines, among many suggestions suitable to the age of the pupils for which the work is intended, some that seem infantile and others that savor of pedantry or at least belong to children of a larger growth. Such expressions as 'strophiole,' 'phytomer,' 'recline praefoliation' and 'indeterminate anthotaxy,' might well be deferred to a later stage of instruction, if introduced at all. Then the work gives a more fragmentary treatment of the spore-producing plants than would be expected from a spe-

cialist in cryptogamic botany, tending, as was the case with Dr. Gray's text-book, on which this is quite closely patterned, to create the impression that all plants produce flowers or at least all that are worth considering. Besides leaving out a half of the plant world, and an important half at that, this plan hides away from the student the great principle of evolution of plant life which would be impressed upon him unconsciously were the study to commence with lower forms or at least give them a fair amount of attention. It is amazing how much knowledge of these lower plants can be gained by means of a simple magnifier, and it is unfortunate, to say the least, to prevent the student, however young, from getting a well-rounded conception of the whole subject. There are some few obsolete expressions in the book like 'stomata or breathing pores' and occasional typographical slips that it is always difficult to avoid in a first edition. On the whole, the merits of the work are much greater than its demerits, and if used by teachers alone, and not by students, it is probably as good or better than most the books of its type.

L. M. UNDERWOOD.

Essai critique sur l'hypothèse des atomes dans la science contemporaine. ARTHUR HANNEQUIN. Annales de l'Université de Lyon. Tome Septième. Paris, G. Masson. 1895. Pp. 419.

This is an interesting and important book of its kind, but it is also a kind of book which to many physicists will need justification. It is a serious attempt to form a philosophy of atomism, and as such will be found to contain too much physics to please most metaphysicians and too much metaphysics to please physicists. That each party in the case may take his own, the book is frankly divided into two parts, the first having to do with atomic theory as actually found in science, and the second with the metaphysics of this theory. But it would be too much to hope that the physics and the metaphysics of atomism had actually been disentangled and separated. Whatever the metaphysician may do the wise physicist will read the whole book if he wishes to get M. Hannequin's complete message.